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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/001,421	11/02/2001	Joseph M. Milewski	END919970013US2	4204
7590	04/08/2004		EXAMINER	
Ratner & Prestia Suite 301 One Westlakes, Berwyn P.O. Box 980 Valley Forge, PA 19482-0980			VU, HUNG K	
			ART UNIT	PAPER NUMBER
			2811	
DATE MAILED: 04/08/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/001,421

Applicant(s)

MILEWSKI ET AL.

Examiner

Hung K. Vu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 11 and 15-19 is/are pending in the application.
- 4a) Of the above claim(s) 15-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Request for Continued Examination***

1 A request for continued examination (RCE) under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/08/03 has been entered. An action on the RCE follows.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 11 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 11, the preamble calls for an intermediate interconnect structure, however, the body of the claim calls for a final structure ("so that Sn from said thin layer and Pb from said ball are diffused and intermixed after reflowing and annealing to form a solder assembly"). It is improper to combine an intermediate structure and a final structure together into one claim since it is unclear as to whether which structure is claimed.

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 11, insofar as in compliance with 35 USC 112 second paragraph, is rejected under 35 U.S.C. 102(b) as being anticipated by Hoebener et al. (PN 5,492,266, of record).

Hoebener et al. discloses, as shown in Figures 4, 5 and 12, an interconnect structure for a semiconductor chip comprising:

a Pb-rich ball (12) attached to the semiconductor chip (9) and having an exposed surface;  
the ball being an assembly which has a relatively high melting point.

Note that the terms “nonreflowed”, “a thin cap layer of Sn on said exposed surface of said Pb-rich ball” and “said Sn layer ... having a melting temperature lower than that of Pb so that Sn from said thin layer and Pb from said ball are diffused and intermixed after reflowing and annealing to form a solder assembly” are method recitations in a device claimed. Note that only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not. Also note that claim 11 recited the product-by-process step to form the structure (“so that Sn from said thin layer and Pb from said ball are diffused and intermixed after reflowing and annealing to form a solder assembly”), therefore, at the final

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structure, only the assembly is existed with no thin layer of Sn. The thickness of the thin layer of Sn does not exist at the final structure.

4. Claim 11, insofar as in compliance with 35 USC 112 second paragraph, is rejected under 35 U.S.C. 102(b) as being anticipated by Crafts et al. (PN 5,492,235, of record).

Crafts et al. discloses, as shown in Figure 8, an interconnect structure for a semiconductor chip comprising,

a Pb-rich ball (19) attached to the semiconductor chip (10) and having an exposed surface;

the ball being an assembly which has a relatively high melting point.

Note that the terms “nonreflowed”, “a thin cap layer of Sn on said exposed surface of said Pb-rich ball” and “said Sn layer ... having a melting temperature lower than that of Pb so that Sn from said thin layer and Pb from said ball are diffused and intermixed after reflowing and annealing to form a solder assembly” are method recitations in a device claimed. Note that only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not. Also note that claim 11 recites the product-by-process step to form the structure (“so that Sn from said thin layer and Pb from said ball are diffused and intermixed after reflowing and annealing to form a solder assembly”), therefore, at the final structure, only the assembly is existed with no thin layer of Sn. The thickness of the thin layer of Sn does not exist at the final structure.

***Response to Arguments***

5. Applicant's arguments filed 06/19/03 have been fully considered but they are not persuasive.

It is argued, at pages 4-5 of the Remarks, that Hoebener and Crafts do not disclose all of the claimed limitations of claim 11 since claim 11 is directed to an intermediate interconnection structure for the semiconductor chip. This argument is not convincing because claim 11 still defines a final structure (“... diffused and intermixed after reflowing and annealing to form a solder assembly”). Since these claims are about the product so that only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not. Also note that claim 11 recited the product-by-process step to form the structure (“so that Sn from said thin layer and Pb from said ball are diffused and intermixed after reflowing and annealing to form a solder assembly”), therefore, at the final structure, only the assembly is existed with no thin layer of Sn. The thickness of the thin layer of Sn does not exist at the final structure.

***Conclusion***

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (571) 272-1666. The examiner can normally be reached on Mon-Thurs 6:00-3:30, alternate Friday 7:00-3:30, Eastern Time.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (571) 272-1732. The Central Fax Number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Vu

March 25, 2004

A handwritten signature in cursive script, appearing to read "Hung Vu", is written over a horizontal line.

Hung Vu

Patent Examiner